

- k*, The Bladder; and
- l*, The umbilical Arteries, with the *Urachus* turn'd down, to shew
- m*, The *Uterus*, &c.
- n, n*, Is an Artery communicating with, and entering into, the *Aorta* of each, near the going off of the Emulgents.
- o*, The Heart of the smaller Child, much too large in proportion, together with the right Auricle.
- p*, Part of the Lungs, which were render'd much too small, in proportion, by the Compression of the large Heart upon them.
- q*, The *Aorta* and pulmonary Artery, as they are connected by the *Canalis Arteriosus* (*r*).
- s, t*, The descending Trunks of the Veins; the latter of which was preternatural, running round the left, and entering into the right Auricle in its posterior Part.

The other Parts were much as those of the former Child in general; except the *Aorta*, which was much smaller, as the Figure shews.

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## XI. An Account of the Preparation and Uses of the various Kinds of Pot-ash; by John Mitchell M. D. & F. R. S.

Read Nov. 17 and 24.  
1748.

**A**LTHO' Pot-ash is a thing daily used, and well known even to the Vulgar; yet, as the making it is a mechanic Art, practised only by the Vulgar, and neglected and overlooked by the Learned, so we have had

no satisfactory Account of it; and they, who understand it, generally keep it a Secret, lest others should learn so beneficial an Art. But as it is a Commodity that no Nation hardly can well be without, either for making Soap, Glafs, Dying, or Bleaching, so the Way of making it is generally understood in most Countries, except our own. For in *France*, and other Countries where they make Wine, they make a kind of Pot-ash in an easy manner from the Lees of their Wine. In those and other more Southern Climes, they have many kinds of Herbs hereafter mention'd, either spontaneous, or cultivated on purpose, which they as easily convert into Pot-ash. In *Germany*, and other more Northern Countries, they make great Quantities of Pot-ash by extracting the Salts of their Wood-ashes, in a manner that is well known. But it is only in *Russia*, *Sweden*, and other Northern Nations, where the Art of converting their Wood-ashes into Pot-ash, without the tedious Proces of Elixivation, is either well known to the Learned, or practised by the Vulgar.

By this means most Nations are supplied with this necessary Commodity of their own, except the *English*, who might be supplied with any Quantities of it, from the great Plenty of otherwise useless Wood they have in their Colonies, if not at home, if they knew how to make it. But it seems this Art is so little understood among us, that many Attempts I have known to make Pot-ash have all proved unsuccessful merely upon that account, so as to be intirely laid aside. This has put me for some time upon inquiring into the Ways of making this

this Commodity, of which several have been suggested to me, from the several Trials and Informations hereafter mentioned.

It is well known, that the Ashes of all kinds of Vegetables whatever afford Pot-ash in some measure or other; altho' some are much more fit for that Purpose than others, which may be determined from the Experiments of Redi in the *Philosoph. Trans.* N°. 243, p. 281. *Boerhaave, Merret*, and others; so that we need not insist upon them here.

As for the Trees and Herbs of our Colonies in *North America*, most of those that are common in their Woods are known to be fit for this Purpose, as the Ashes of them all, burnt promiscuously in their Houses, make a very strong Lye fit for Soap. Of these, the fittest for that Purpose is their *Hickory*, the most common Tree in their Woods, which makes the purest and whitest Ashes, of the sharpest Taste, and strongest Lye, of any Wood I have seen. Their *Stickweed* is said to do the same, which is as common a Weed. For this Reason the Ashes of both these Plants were used by our *Indians* there, instead of Salt, before they learnt the Use of common Salt from the *Europeans*. The Ashes of *Tobacco* likewise, when damnified, or not fit for a Market, or its Stalks, Stems, and Suckers, of which great Quantities are thrown away, and rot and perish, are very fit for Pot-ash, as they contain a great deal of Salts, and are well known to make a strong Lye.

On the other hand, *Pines, Firs, Sassafras, Liquid Amber, or Sweet Gum*, or all odoriferous Woods, and those that abound with a Resin or Gum,

Gum, are unfit for Pot-ash, as their Ashes are well known, even to our Planters, to make a very weak Lye, unfit for Soap.

Besides these that contain little or no Salt, there are some other Vegetables that afford a large Quantity of it, but make a bad kind of Pot-ash, at least for many Purposes, on account of a neutral Salt with which they abound. This seems to have been the Case of the Pot-ash made in *Africa*, in a Manufacture of that Commodity set up there by the *African Company*, which Mr. *Houfton* (who was chiefly concerned about it) tells us, in his *Travels*, proved so bad, on account of a neutral Salt it contained, that the Manufacture was left off on that account; or, perhaps, from their not knowing how to make it aright. What those Vegetables are, that afford this kind of Ash, is not well known, if it be not Fern, and some Sea-Plants.

Whatever Vegetables we make our Pot-ash of should be fresh or green, and no-ways rotten, dried, or decay'd. They should likewise be burnt to Ashes by a slow Fire, or in a close Place; otherwise, when they are burnt in the open Air by a strong Fire, great Quantity of the Ashes is consumed in Smoke, by the saline and terrestrial Parts being carried up in Fumes, before they are separated from these exhalable Parts by the Action of the Fire. For the Difference between burning Wood in a close Place, or the open Air, is so great, that the Quantity of Ashes obtained from one is more than double the other. This we learn from the Experiments of *Lundmarck* hereafter mention'd, who tells us, he burnt a Quantity of Birch in a close

close Stove, from which he obtained five Pounds of Ashes; whereas the same Quantity of the same Wood burnt in the open Air, yielded only two Pounds.

It is for this Reason, that most People who make Pot-ash, burn their Wood in Kilns, or Pits dug in the Ground; altho' the *Swedes* burn it in the open Air, as the Author above-mention'd informs us. This first Step, or the burning the Wood to Ashes, seems to be taken by many for the whole Process of making Pot-ash; for they who pretend to have learned this Art in *Russia*, as well as *Lemery* and some other Authors, hardly give us any other Account of it.

But, in order to convert the Ashes, prepared in this or any other manner, to what is called Pot-ash, there are many different Ways practised in different Countries, which make as many different kinds of Pot-ash, that are all to be found in our Markets, and have all their respective Uses.

1. The first of these is commonly called Pearl-ashes by our People, who import great Quantities of it from *Germany*. This is no other than the lixivial Salt of Wood-ashes, extracted by making a strong Lye of them, and by evaporating it to Dryness, in a manner that is well known, and sufficiently explained by *Kunkelius* in his Art of making Glass, *Boerhaave*, and many others; so that we need not insist upon it here; we shall take a more fit Opportunity to explain it, for the Use of our People in *America*.

2. But the Art of converting these Wood-ashes into Pot-ash, without this tedious Process of Elixivation,

is only practised in *Russia*, *Sweden*, and other Northern Countries, where it has been lately disclosed by one *Lundmarck*, who tells us he had often made it himself, in the manner he now describes. This Account is contained in an academical Dissertation upon this Subject at *Aboe* in *Sweden*, and was communicated to me by Dr. *Linneus*, Professor of Botany at *Uppsal*, as a genuine Account of this Art; which I think has hitherto been generally unknown.

This Author tells us, " They have many large Woods of Beech in *Smoland*, and other Parts of *Sweden*, in want of which they take Alder: Of these they are allowed to use only the old and decaying Trees for this Purpose, which they cut to Pieces, and pile in a Heap, to burn them to Ashes, upon the Ground, by a slow Fire. They carefully separate these Ashes from the Dirt or Coals in them, which they call raking them; after which they collect them in Baskets of Bark, to carry them to a Hut built in the Woods for this Purpose. This they continue to do till they have a sufficient Quantity of these Ashes. Then their whole Art follows; for which they choose a convenient Place, and make a Paste of these Ashes with Water, by a little at a time, in the same manner, and with the same Instruments, as Morter is commonly made of Clay or Lime. When this is done, they lay a Row of green Pine or Fir-Logs on the Ground, which they plaster over with this Paste of Ashes: Over this they lay another Layer of the same strait Logs of Wood, transversely or across the others, which they plaster over with the Ashes in the same manner.

“ manner: Thus they continue to erect a Pile of  
 “ these Logs of Wood, by Layer upon Layer, and  
 “ plastering each with their Paste of Ashes, till they  
 “ are all expended; when their Pile is often as  
 “ high as a House. This Pile they set on fire with  
 “ dry Wood, and burn it as vehemently as they  
 “ can; increasing the Fire from time to time, till  
 “ the Ashes begin to be red-hot, and run in the  
 “ Fire. Then they overset their Pile with Poles,  
 “ as quickly as they can; and while the Ashes are  
 “ still hot and melting, they beat and clap them,  
 “ with large round flexible Sticks made on pur-  
 “ pose, so as to incrust the Logs of Wood with the  
 “ Ashes; by which the Ashes concrete into a solid  
 “ Mass as hard as Stone, providing the Operation has  
 “ been rightly performed. This Operation they  
 “ call *Walla*, i. e. *Dressing*. At last they scrape  
 “ off the Salt thus prepared, with iron Instruments,  
 “ and sell it for Pot-ash; which is of a bluish dark  
 “ Colour, not unlike the *Scoriae* of Iron, with a  
 “ pure greenish white Salt appearing here and there  
 “ in it.”

All the Pot-ash we have from *Russia*, *Sweden*, and *Dantzick* is exactly like what our Author here describes, and seems to be made in this manner. It is, however, generally observed, that the *Russian* is the best of these, on account of the greater Quantity of Salt in it. Now if, in the preceding Process, we make our Paste of the Ashes with Lye, instead of Water, it is plain the Pot-ash will be impregnated with more Salt, and make all the Difference there is between these Sorts of Pot-ash. This then is likely to be the Practice in *Russia*; where their

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Wood

Wood may likewise be better for this Purpose, and afford more Salt. This is well known to be the Case of different Kinds of Wood: So our Author above-mentioned tells us, he obtained  $2\frac{3}{4}$  lb of Salt out of eight cubic Ells of Poplar, which was very sharp and caustic; but the same Quantity of *Birch* afforded only one Pound of Salt, and that not so strong; and *Fir* hardly yielded any at all.

The Way of making Pot-ash above-described may be the more easily understood by our People in *America*, for whom this is chiefly intended, as it is the same with their Way of making Lime of Shells, the only Lime they use in most Places. These Shells they burn to Lime between the Layers of a Pile of Wood (instead of a Kiln) till it is reduced to Ashes, in the same manner as is here directed to be done with Ashes, to make Pot-ash. The Lime, thus made, is reckoned very good; but, as it is impregnated with the Ashes of the Wood, and the marine Salt that is often in the Shells, it is apt to make the Houses that are built with it very damp in moist Weather; so that the Water often runs down their Walls in Streams; which cannot but be very unwholesome in an Air that is naturally close and damp: The only Way to prevent which would be, to wash and dry their Shells frequently, and burn them in dry Pine, that afford little or no lixivial Salt. But to return to our Purpose:

3. There is another Way of making Pot-ash, practised chiefly in *England*, where they make it in the following manner, as I am informed by several, who have seen it done:

With

With their Ashes of Fern, or Wood of any kind, they make a Lye, which they reduce to what they call Pot-ash, by burning it with Straw. To do this, they place a Tub full of this Lye nigh a clean Hearth of a Chimney, in which they dip a Handful of loose Straw, so as to take up a Quantity of Lye with it. The Straw thus impregnated with Lye they carry as quick as they can, to hold it over a blazing Fire on their Hearth, which consumes their Straw to Ashes, and at the same time evaporates the Water from the Salts of the Lye. Over the Blaze of the first Parcel of Straw they burn another dipt in Lye in the same manner. This they continue to do till their Lye is all expended. By this means the Coals and Ashes of the Straw, and Salts of the Lye, are left on the Hearth, and concrete together into a hard solid Cake of a greyish black Colour, which they scrape off, and sell for Pot-ash.

This is an easy Way of making Pot-ash, in want of proper Vessels to extract the Salt of the Lye by Evaporation, or in want of Wood to reduce the Ashes to Pot-ash in the Way above-mentioned, for which it seems to be contrived, and for which it is only to be commended. For the Pot-ash made in this manner is full of the Coal of the Straw, and its Salt is not so strong, as our Workmen say, or so sharp and corrosive as the Salt of the foreign Pot-ash, that is calcined in an open Fire; besides other Differences hereafter mentioned; which makes this Pot-ash unfit for some Purposes, and not above half the Value of the foreign.

4. They have a very different Way in the North of *England* of reducing their *Kelp* to Pot-ash, which they use for making Alum. This is made of the different Kinds of *Fuci*, or Sea-Weeds thrown up on the Shore, or gather'd on the Rocks ; which they dry a little in the Sun, and afterwards burn them in a Kiln, built of the Stones they find on the Shore, in a cylindrical Form, and about two Foot or less in Diameter. In this they first burn a small Parcel of the Herb, and before it is reduced to Ashes they throw on more, till the Kiln is full, or their Materials are expended. This is said to reduce the Ashes to a hard and solid Cake, by the Heat of the Kiln, and Quantity of Salt in the Herb, which makes what is commonly called *Kelp-Ashes*.

There are some other Ways of making Pot-ash, suggested by several, both Authors and others, which appear to be more easy and ready than any of the above-mentioned ; for which Reason they are apt to be tried by those who make Attempts of this kind. These are deduced from what they reckon the Nature and Properties of this Production : And there is no doubt, but if that was well understood, it might afford some Insight in the Way of making it. For this Reason we made the following Experiments with the best *Russia* Pot-ash, in order to discover its Nature and Properties, and how they are most probably communicated to it ; that we might see what we are to make ; in order to imitate the best, or to make what is accounted good Pot-ash.

1. *Russia* Pot-ash, as it is brought to us, is in large Lumps, as hard as a Stone, and black as a Coal,

Coal, incrusted over with a white Salt, that appears in separate Spots here and there in it.

2. It has a strong fetid sulphureous Smell and Taste, as well as a bitter and lixivial Taste, which is rather more pungent than other common lixivial Salts.

3. A *Lixivium* of it is of a dark-green Colour, with a very fetid sulphureous Smell, and bitter sulphureous Taste, somewhat like Gunpowder, as well as sharp and pungent like a simple *Lixivium*.

4. Altho' it is as hard as a Stone, when kept in a close Place, or in large Quantities together in a Hogshead; yet, when laid in the open Air, it turns soft, and some Pieces of it run *per deliquium*; whilst most other kinds of Pot-ash only turn friable, and crumble in the open Air.

5. It readily dissolves in warm Water, but leaves a large Sediment of a blackish grey Colour like Ashes, which is in a fine soft Powder, without any Dirt or Coals in it, that are to be observed in most other kinds of Pot-ash.

6. As it is dissolving in Water, I have scummed off from some Lumps of it a dark-purple bituminous Substance, like *Petroleum* or *Tur*, which readily dissolved in the *Lixivium*.

7. This, or any other true Pot-ash, or a *Lixivium* made of them, will presently tinge Silver of a dark-purple Colour, difficult to rub off; whilst a mere lixivial Salt has no such Effect.

8. Pieces of this Pot-ash boiling in Water make a constant Explosion like Gunpowder; which was so strong as not only to throw the Water to some Height, but to lift up and almost overset a stone Cup

in

in which I boiled them. These Explosions were owing not so much to the included Air, which some perhaps may imagine, as to the sulphurous Parts of the Composition expanding and flying off: For this boiled *Lixivium* had neither the green Colour, nor fetid sulphurous Smell and Taste; at least in any degree like what it has when made of the same Pot-ash by a simple Infusion in warm Water.

9. I evaporated some of the green *Lixivium*, made only by Infusion, and filtered thro' a double Rag: As soon as it began to boil, a green Powder, to which its Colour is owing, fell to the Bottom, and the Lye became pale. After it was evaporated to a Pellicle, and set in a cool Place, a Salt separated from it on the Sides of the Cup, in angular Crystals like Tartar. These Crystals were soon formed, and in pretty large Quantities, but were difficult to separate from the alkaline Lye and Salt, in which and the open Air they were apt to dissolve: But from the Pellicle I obtained some Pieces of the same Salt that would not dissolve in the open Air.

10. Oil of Vitriol makes a strong Effervescence with this green Precipitate, with a white Fume, and a very strong sulphurous Smell. It does the same with these white Crystals, altho' the sulphureous Smell is not so strong. But with the pure fixed Alkali there was no such sulphurous Smell to be discerned.

From these Experiments we may determine something about the Nature and Contents of Pot-ash. This we are the better enabled to do, from the accurate

accurate Experiments and Reasonings of the learned Mr. *Geoffroy*, on a like Substance made of Charcoal and an Alkali Salt calcined together, in which he observed all the Properties and Contents of Pot-ash above mentioned, particularly related in the *Memoirs of the Royal Academy*, for the Year 1717. This was made of the same Materials, and had all the Properties above-related of our Pot-ash; particularly a green *Lixivium*, a strong sulphureous Smell and Taste, a sulphureous green Precipitate, crystallized Salts, and sulphureous Fumes with Oil of Vitriol. From hence this learned Author concludes, that this Substance contained the active sulphureous Parts of the Wood, blended with more active igneous Particles. These, united with the alkaline Salts, make a kind of Soap, or sulphureous saponaceous Salt, resembling Soap of Tartar, or *Hepar Sulphuris*. The crystallized Salts he attributes to the Acid of the Wood, mixing with the alkaline Salts. All these Parts of the Wood then are contained in our Pot-ash; and he observed the same in the common Soda, or *Cineres clavellati*; altho' they are in a less Degree in that than in the *Russian* Pot-ash.

Besides these, he shews that Pot-ash contains a metallic Substance, which affords the *Prussian* Blue. We may add further, that the Combination of these Principles makes many Properties in Pot-ash, more than what result from them in a State of Separation. The most remarkable of these seems to be its explosive Quality; which we take to proceed from the crystallized Salts approaching to the Nature of Nitre, and uniting with the Sulphur and Charcoal; by which they form, from all these Ingredients of Gunpowder,

Gunpowder, a kind of that explosive Substance, whose Parts are highly rarefied in an intense and confined Heat, by which they readily explode in boiling Lye.

By this we may perceive, that the Difficulty in making Pot-ash aright, is, first, to reduce the Materials to Cinders and Ashes, and at the same time to preserve their volatile, sulphureous, and exhalable acid Parts, that are totally destroyed in such a Degree of Heat; and, secondly, to calcine these Ashes still further, so as to flux their Salts, and vitrify their terrestrial Parts, and at the same time to keep them separate from each other, or prevent their running into an indissolvable Glass. To give Pot-ash some of these Properties, seems plainly to require a Degree of Heat that will totally deprive it of others.

The most likely Way by which it comes to receive all these Properties, is from the Way of making it in *Sweden* above described. In that Process, the green Fir, in which the Ashes are burnt, impregnates them with the acid saline Parts of the Wood or Tar, which is well known to be in pretty large Quantities, and is absorbed and fixed by the alkaline Salts, and porous terrestrial Parts of the Ashes in this Process; so that, besides the fixed alkaline Salts of the Ashes, the Pot-ash, thus made, must likewise contain the more volatile Salts of the Pine, which are exhaled in Smoke by burning the Pine alone in the open Air. Besides these, it likewise contains the resinous Parts and sulphureous Fumes of the Pine, that are hindered from exhaling by the Heap of the Mass.

At

At the same time the alkaline Salts are fluxed in the open Fire, and in a manner vitrified with the terrestrial Parts of the Ashes, which gives them their hard and solid Consistence; whilst the sulphureous and acid Parts of the green Wood hinder them from turning to a perfect Glass, or inert *Calx*. All these Parts united together in the Fire, make that saponaceous Substance we find in the Pot-ash thus made, which further hinders the Vitrification of the Mass, and endows it with many of its most peculiar and active Properties.

From hence we may see how difficult it is to make a Substance endowed with all these Properties in any other manner. This is the Reason why we could never before make Pot-ash equal to that of *Russia*, and the other Northern Countries, altho' we have much greater Plenty of Materials and perhaps better: For this Way of making it has never before been thought of by the Learned, or practised anywhere else, as far as I can learn.

Somewhat of the same Qualities are communicated to the *English* Pot-ash, by the Way of making it above-described; but in a Degree as much inferior, as dry Straw, used for that Purpose, is to green Wood: Accordingly our Workmen find that Pot-ash as much inferior to the foreign, for many Purposes.

From this Account of the Contents and Qualities of Pot-ash, and the Way of making it, we may form some Judgment of the other Ways of making it, proposed by Authors, and suggested by many. Thus *Lemery* and others tell us, Pot ash is made in *Russia*, and all the Northern Countries, only by  
 D d d d calcining

calcining the Ashes in Pits brick'd within, and sprinkling them well with Lye, till they become hard and solid. But such a Calcination of Ashes with a lixivial Salt, must render them whiter, instead of black, and must further destroy the active sulphureous Parts of the Wood, which we find in Pot-ash rightly made. So that this only leaves the Ashes in the State they were at first, or turns them into a kind of indissoluble Glass, as we have found upon Trial.

This, and the like Mistakes about the Way of making Pot-ash, seem to proceed from a general Error concerning the Nature of it; for it is commonly supposed to be only a kind of inert *Calx*, impregnated with nothing but a lixivial Salt. Some such Mistake seems to have frustrated all the Attempts hitherto made of making Pot-ash in *America*; for, upon Trial, what they have made there was found to be no better than common Ashes.

But the most general Mistake about the Way of making Pot-ash, seems to proceed from the Accounts we have of making it, from Glasswort, and some marine Plants, which are said to be easily converted to this kind of Substance, in the manner above-mentioned. But we apprehend, the Way of making it from Wood must be very different: For these Herbs are easily reduced to Ashes by a small Fire, that does not intirely consume their sulphureous Parts, which Wood is not. These Ashes abound with a great Quantity of alkaline and some neutral Salts, that readily convert them to a hard and solid Consistence, which Wood does not. They have likewise few or no terrestrial Parts, to run them into an indissolvable Glass, when fluxed in the Fire,

as happens in Wood-ashes. Besides, these Herbs have few or no sulphureous or acid Parts, like most Woods; and the Pot-ash made of them has few of these Principles in it, like what is made of Wood.

It is however generally said, if we burn our Wood in a close Place, as a Kiln in which we burn Lime, or make Charcoal, or a Pit dug in the Ground, we may impregnate the Ashes with the sulphureous Fumes and acid Parts of the Wood, only by the Closeness of the Place, or by smothering the Fire in it. If at the same time we impregnate them with a greater Quantity of lixivial Salt, it will flux the whole Mass, and make it run into a solid hard Consistence like Pot-ash. This is commonly directed to be done, by throwing fresh or green Wood or Herbs upon the others, as they are burning, before they are quite reduced to Ashes; or by smothering the Fire, as in making Charcoal; and at the same time to sprinkle the Ashes, thus burnt, with a strong Lye from time to time, in the manner commonly practised with Glasswort.

This would be a more ready Way of making Pot-ash than any of the above-mentioned; but as those who give their Advice about it, have neither tried it, nor seen it done; and those who have tried this or any other Way, find more Difficulty in it, than they at first imagined, we shall suspend our Judgment about it, till we see it fairly tried, lest we should deter some from making useful Experiments of it, or lead others into fruitless and expensive Attempts.

By the various Ways of making Pot-ash above-mentioned, and the different Materials it is made of, there appear to be many different Kinds of it,

that have as different Qualities. It would lead us too far beyond our present Design, to give a particular Account of each of these ; but as they are used in many of our Manufactures, it seems worthy Inquiry, to know what Sorts are generally used, and what are the fittest to be used in them.

The Workmen in *England* make two general Kinds of it, which they distinguish by the Names of Pearl-ash and Pot-ash. The first is a mere lixivial Salt, which is supposed to be the only Ingredient of any Efficacy in Pot-ash ; but, upon Trial, there is found to be a great Difference between them, especially in making Soap. The Salt is so weak in the Pearl-ash, that it does not intirely dissolve and unite with the Fat. The Reason seems to be, that these Salts are dissolved in Water, in order to extract them, by which they lose many of their caustic igneous Parts; whereas in Pot-ash, the Salts are calcined and fluxed in an open Fire, with the ignited terrestrial Parts of the Ashes, which makes them more sharp and corrosive : They are likewise incorporated with the Coal, and fuliginous Parts of the Vegetables they are made of, or with the resinous Parts of Fir, which gives them the sulphureous Quality above-mentioned, and makes a kind of *Soap of Tartar, or Hepar Sulphuris*, in all Pot-ash ; which makes these Salts so ready to dissolve, and incorporate with Oil, or other punguous Substances.

This is perhaps the Reason, why the *Cineres Russici* are ordered for this Purpose, instead of a mere lixivial Salt, by the *College of Physicians* in their late Dispensatory. The Soap made of them must be impregnated with their heating sulphureous Quality,

Quality, which will make it more aperient and detergent, but not so mild and soft as some others; by which it may be more fit for obstinate and indurated Obstructions, but will be more offensive to the Stomach; which is much complained of by some People, who take large Quantities of the sharper Kinds of Soap.

But, to consider Pot-ash as a Commodity in Trade and Manufactures, which is its chief Use; it appears, that the People in *England* not only have it at a dear Rate, but the worst Sorts of it, at least for most Purposes; which cannot but have a proportional Influence on their Manufactures: For it is generally of as great, and some Sorts of a greater Value in their Markets, than a pure lixivial Salt; notwithstanding the small Quantity of such Salt in Ashes, and the Trouble and Expence of extracting it; which seems to be occasioned by their not knowing how to convert Ashes into this Commodity; for in *Sweden*, where this Art is known, *Lundmarck* tells us, Pot-ash is sold for little more than a Farthing a Pound, which costs our Workmen nigh Six-pence.

But this is not the only Inconvenience we labour under for want of this Commodity; the Sorts we are chiefly supplied with are perhaps the worst of any, and unfit for many Purposes for which Pot-ash is used. The only Pot-ash almost to be met with here, comes from *Russia*, *Sweden*, and *Dantzick*, or is made in *England*. These are all made either of Wood or Fern-ashes, whose Salts are never so pure and white at the best, as some others: But, by the Way of making them, and the Experiments on them above-mentioned, they

they appear to be impregnated with Coal, Smoak, and Soot, which renders them still more foul and impure, makes them of a black, brown, or green Colour, and of a peculiar sulphureous Quality. On this account they are intirely unfit for making white Glass: They make a very coarse and strong kind of Soap; they are too foul, sharp, and corrosive for bleaching, and are as unfit for dyeing, at least many Colours.

It is perhaps for this Reason, that the Workmen here, as they shewed me themselves, make all their white Glass with Salt-petre; which must not only be more costly, but *Neri*, *Merrett*, and others, tell us it is not so good, at least for the better Sorts of Glass, as a sharper lixivial Salt. What they use for dyeing I am not so well apprised of: It is said, they use the volatile Alkali of Urine; but the *French* Pot-ash, made of the Lees of Wine, is generally allow'd to be the best for that Purpose. So likewise the *Alicant* Pot-ash is reckoned much the best for bleaching, and making of Soap; as the *Syrian* and *Egyptian* is for making Glass.

These purer Kinds of Pot-ash are all made of Herbs, that grow only in the more Southern Climates, whose Salts are finer and whiter, and less acrid and corrosive than the Salts of Wood, or most other Vegetables; and by the Way of extracting them by Calcination in a more open Fire, they are more free of Coal, Smoak and Soot, or any other heterogeneous Mixture. On this account they are much better for the Purposes above-mention'd, than the coarse and foul Kinds of Pot-ash that our People are supplied with.

All we have of these Kinds of Pot-ash, it seems, comes only from *Spain*; for which Reason our People were obliged to petition to allow the Importation of Pot-ash from thence, during the late War; as appears by an Order of the King and Council of the 24<sup>th</sup> of June 1742, since they could not do without it in many Manufactures: So that it may be worth our Inquiry, to know what it is that produces so necessary a Commodity.

This Kind of Pot-ash is commonly called *Barrilha*, from an Herb of the same Name in *Spain* that produces it. The first Account we have of this *Barrilha* is from *Amatus Lusitanus*, who leaves us much in the dark about it. It is generally said in *England* to be a Plant pretty well known to the Botanists by the Name of *Ficoides Neapolitana, flore candido. Hort. Lugd. Bat.* but for what Reason I cannot say. We have as little Reason to believe with *John Bauhine* that it is what he calls *Kali vulgare*: For Mr. *de Jussieu* has shewn us, that the true *Barrilha* is a different Plant from any of these, from his own Observations of it in *Spain*, where it was cultivated; of which he has given us a particular Account, by the Name of *Kali Hispanicum, supinum, annuum, Sedi foliis brevibus. Mem. Academ. Anno 1717. p. 93. or Alicant Glasswort.*

The Pot-ash made of this Plant, he tells us, makes the best Soap, the finest Glass, and is the best for bleaching of any other; for which Reason it is much sought after in all Countries, where they value themselves for these Manufactures. But I question very much, whether our Workmen have it either pure and

and genuine, or in sufficient Quantities for these Purposes. All the Use I find made of it among them, is to make hard Soap; altho' they say what they have of it spoils their soft Soap, by making it curdle. This is well known to be the Effects of Sea-Salt; and Mr. *de Jussieu* and others tell us, that the true *Barrilha* is often adulterated with Sea-weeds, which contain such a marine Salt; so that it is probably only this adulterated Sort that they have. Accordingly, all the *Barrilha* I have found here, was of a dark-brown Colour, and very foul and ponderous; whereas the true Sort is said, by all who know it, to be more porous, pure, and of a bluish Colour. It is for this Reason in all Probability, that, notwithstanding all the *Barrilha* our Workmen have at so dear a Rate from *Spain*, yet they can never make so good Soap, as what comes from thence, and some other Places.

The only Way then, by which we are likely to have this Commodity either pure and genuine, or in sufficient Quantities at a reasonable Rate, is from the Herb itself that produces it. Whether or not it would grow in *England* is not known, as I believe it has never been tried: But there is no doubt but it would grow very well in our Colonies in *America*, as I am certainly informed it does in the *Spanish* Colonies there, where they have great Plenty of it; and a Sort that is indigenous, particularly in *Peru*, which might probably be found in our Colonies, if sought for by those who knew it. But wherever it will grow in any of the *English* Dominions, there is no doubt but it would be a considerable Improvement, where Pot-ash of all kinds is so valuable a Commodity,

Commodity, and so much wanted; for it grows on the same Ground with Corn of any kind, which it does no Harm to, as it is a small annual Herb, that does not spread till the Corn is ripe, or off of the Ground.

There are some other Plants that are known to make a kind of Pot-ash, commonly called *Rochetta*, which is said to be even preferable to the *Barrilha*, especially for making Glass. These are the first and second Kinds of *Kali*, described by *Prosper Alpinus*, in his Account of the Plants of *Egypt*. The first of which is the above-mention'd *Ficoides* that grows in *Italy*, and all over the *Levant*, but the other is peculiar to *Egypt*. These would be fit Improvements for our Colonies in *America*, where we seem to want nothing more than some proper Production for the vast Tracts of Land we are possessed of there. But these Plants alone afford a Commodity, which *Pr. Alpinus* and *Rauwolfius* tell us they saw many large Ships yearly loaded with in *Egypt*, and which gives the Excellency to the Glass and Soap that are made at *Venice*.

It would be worth while then at least to make a Trial of a Production, that is likely to improve both our Trade abroad, and our Manufactures at home. It was this that put me upon the present Inquiry, as an Improvement fit for our Colonies, which if I find acceptable, I shall hereafter consider some others.